Indian Health Service Data Brief ❖ April 2017

The Oral Health of American Indian and Alaska Native Children Aged 6-9 Years: Results of the 2016-2017 IHS Oral Health Survey

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Key Findings

1. The oral health of American Indian and Alaska Native elementary school children aged 6-9 years has not changed significantly in the last five years.
2. Compared to the general U.S. population and other racial-ethnic groups, American Indian and Alaska Native children suffer disproportionately from dental disease.
3. Compared to American Indian and Alaska Native children screened at elementary schools, American Indian and Alaska Native dental clinic patients have a higher prevalence of dental sealants and untreated dental caries.
4. Since 1999, there have been significant improvements in the oral health of American Indian and Alaska Native dental clinic patients aged 6-9 years.
5. IHS, Tribal and Urban programs have surpassed the Healthy People 2020 objective for dental sealants but have not met the objectives for dental caries.

Recommendation

To improve the oral health of American Indian and Alaska Native school-age children, we recommend that programs prioritize access to preventive and restorative dental care.

Dental caries (tooth decay) is a serious public health problem that can affect a child's overall health and well-being. It can lead to pain, low self-esteem, nutritional problems, and lost school days. Children with dental pain are three times more likely to miss school, resulting in poorer school performance.[1] For American Indian and Alaska Native (AI/AN) children, this health problem begins early. By the age of 2, approximately 39% of AI/AN children have experienced dental caries and by the age of 5, caries affects 76% of AI/AN children.[2]

As part of our ongoing oral health surveillance system, the Indian Health Service (IHS) coordinated two nationwide oral health surveys of AI/AN school children in kindergarten, first, second and third grade. The first survey was completed during the 2011-2012 school year[3] while the second was completed during the 2016-2017 school year. In 2016-2017, a total of 5,747 AI/AN children were screened at 76 schools in 16 states, of which 4,833 were 6-9 years of age. The sampling frame for the elementary school survey consisted of all schools with Bureau of Indian Education (BIE) oversight as well as public and private schools where at least 50% of the students are AI/AN (40% for California and Oklahoma). In addition to the school-based survey, dental clinic patients aged 6-9 years were screened at 46 different IHS, Tribal and Urban (I/T/U) dental clinics during 2016-2017. A total of 1,737 dental clinic patients aged 6-9 years were screened.

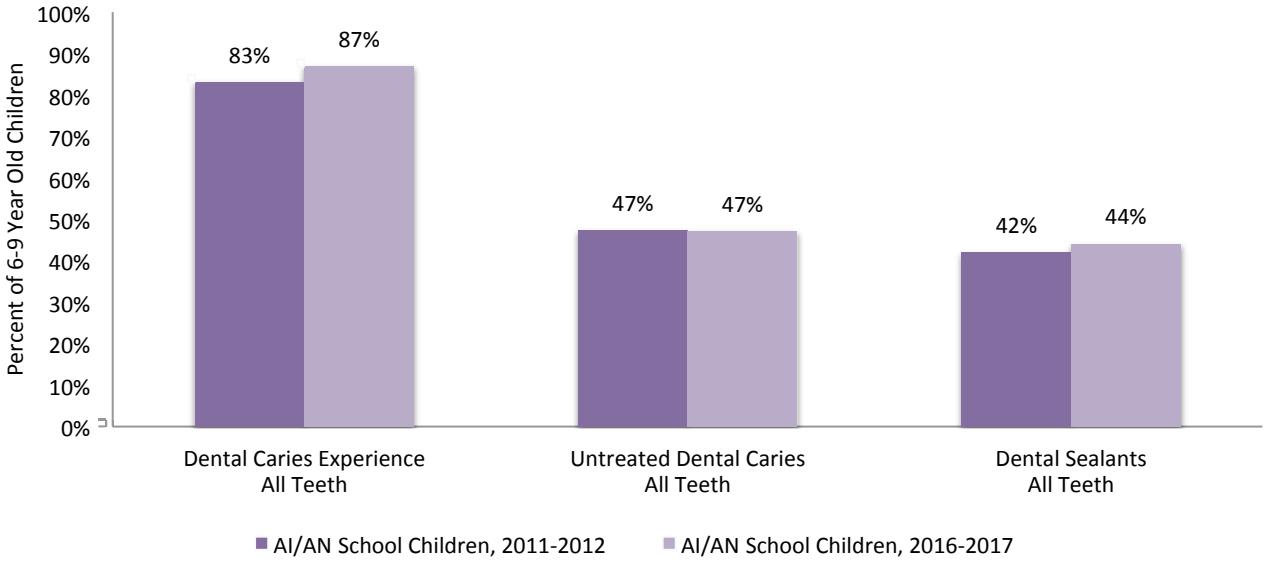
This data brief presents information on the prevalence of dental caries in the primary and permanent teeth of AI/AN children in 2016-2017. It also describes the prevalence of dental sealants, a plastic-like coating applied to the chewing surfaces of teeth to prevent tooth decay. The results of the 2016-2017 oral health

survey are presented as five key findings and one overall recommendation (sidebar).

Key Finding #1: The oral health of American Indian and Alaska Native elementary school children aged 6-9 years has not changed significantly in the last five years.

With the 2016-2017 oral health survey, Indian Health Service takes its second look at the oral health of a random sample of AI/AN children in kindergarten, first, second and third grade. The first survey of school children was completed during the 2011-2012 school year.[3] The prevalence of dental caries experience, dental sealants and untreated dental caries among AI/AN elementary school children aged 6-9 years has not changed significantly since 2011-2012.

Figure 1: Prevalence of dental caries experience, untreated dental caries and dental sealants among 6-9 year old AI/AN children; 2011-2012 compared to 2016-2017

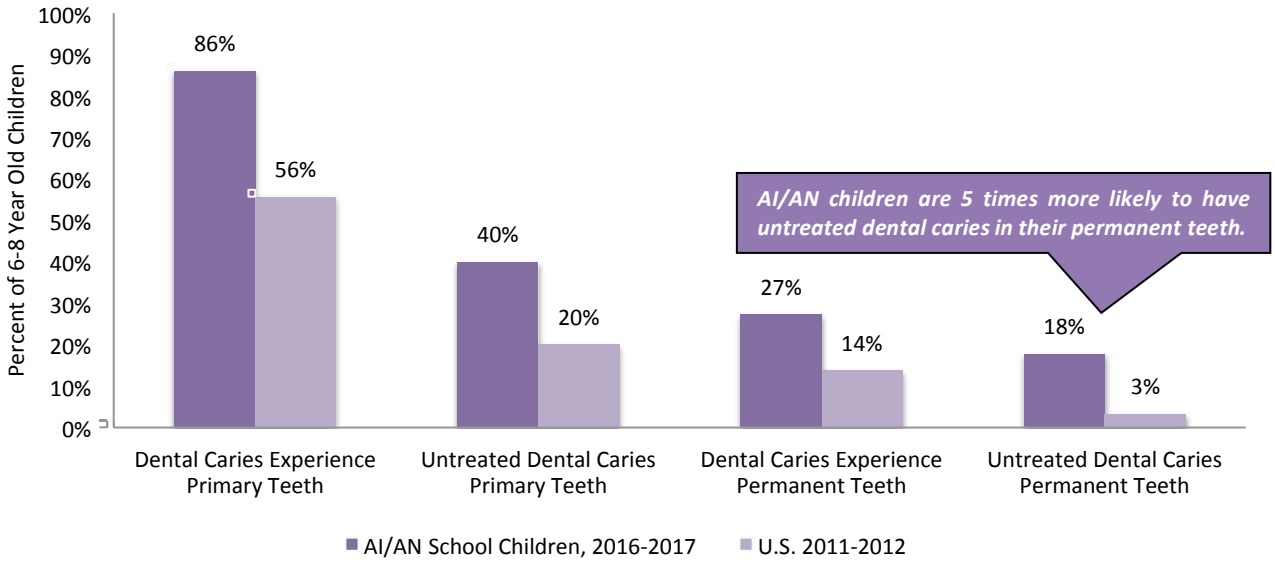


Data Sources: 2011-2012 and 2016-2017 IHS oral health surveys of AI/AN elementary school children

Key Finding #2: Compared to the general U.S. population and other racial/ethnic groups, American Indian and Alaska Native children suffer disproportionately from dental disease.

As depicted in Figure 2, AI/AN elementary school children have a higher prevalence of both dental caries experience and untreated dental caries than the general U.S. population. In terms of dental caries experience, 86% of AI/AN children have had a cavity in their primary (baby) teeth sometime during their lifetime compared to 56% of the general U.S. population.[4] Disparities are particularly evident when the prevalence of untreated dental caries is considered. Compared to the general U.S. population, AI/AN children are twice as likely to have untreated dental caries in their primary teeth and are five-times more likely to have untreated dental caries in their permanent (adult) teeth. The most current published data for the general U.S. population (not specific to race/ethnicity) is for children 6-8 years of age;[4] therefore, the information for AI/AN children in Figure 2 is limited to the subset of the 4,281 AI/AN elementary school children aged 6-8 years.

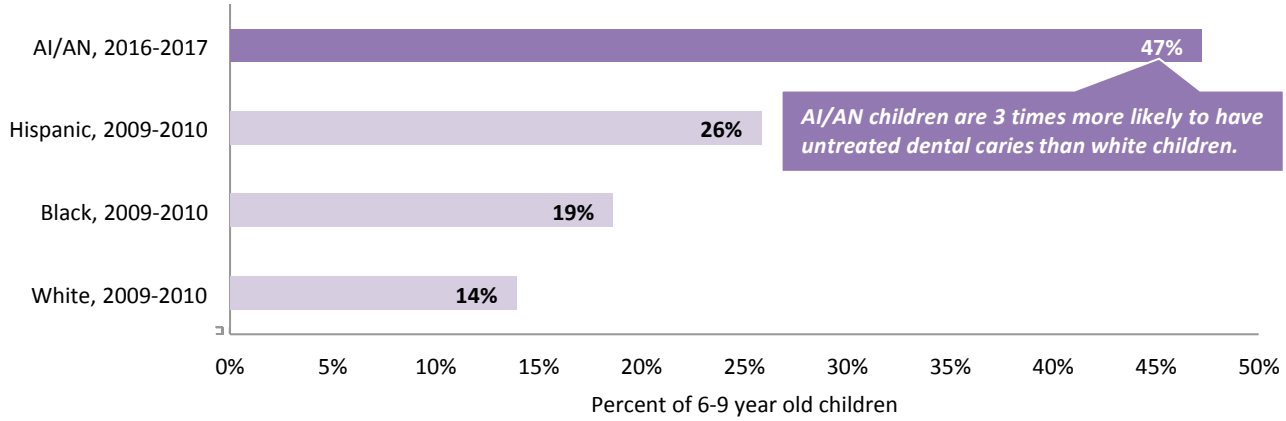
Figure 2: Prevalence of dental caries experience and untreated dental caries among 6-8 year old children; AI/AN children compared to the general U.S. population[4]



Data Sources: 2016-2017 IHS oral health survey of AI/AN elementary school children, NHANES 2011-2012

When compared to other racial/ethnic population groups, AI/AN children have the highest prevalence of untreated dental caries in their primary and/or permanent teeth (Figure 3). Slightly more than 47% of AI/AN children have untreated dental caries compared to only 14% of white non-Hispanic children; a 3-fold difference.[5] The most current published data by race/ethnicity for the general U.S. population is for children 6-9 years of age;[5] therefore, the information for AI/AN children in Figure 3 includes all of the 4,833 elementary school children that were 6-9 years of age.

Figure 3: Percent of children 6-9 years of age with untreated dental caries in primary or permanent teeth by race/ethnicity[5]

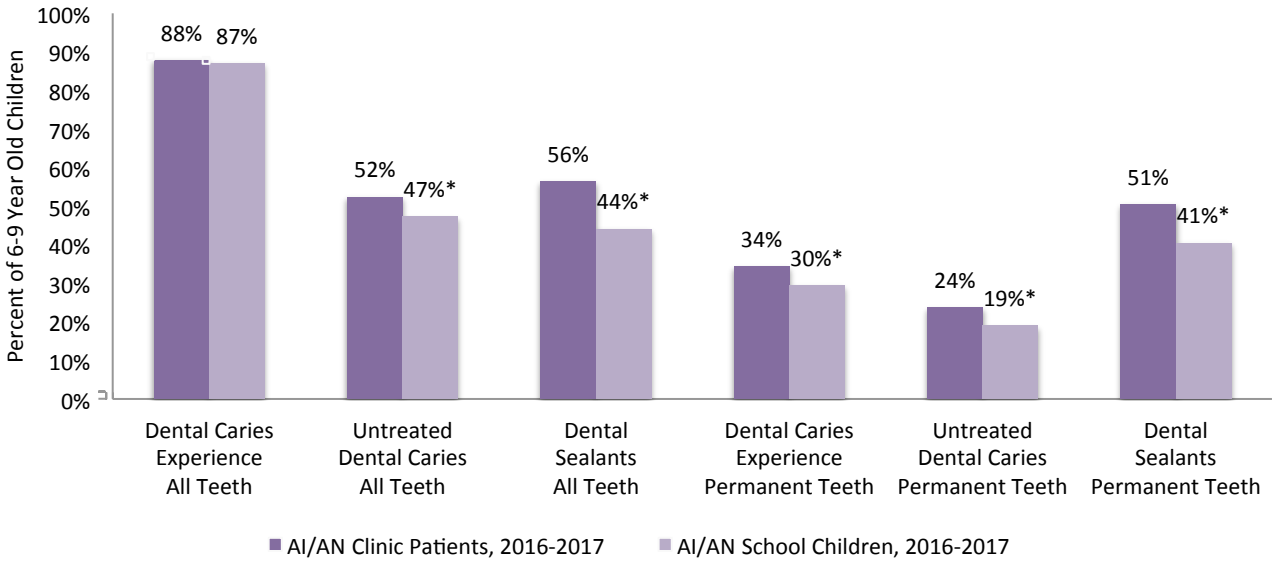


Data Sources: 2016-2017 IHS oral health survey of AI/AN elementary school children, NHANES 2009-2010

Key Finding #3: Compared to American Indian and Alaska Native children screened at elementary schools, American Indian and Alaska Native dental clinic patients have a higher prevalence of dental sealants and untreated dental caries.

Prior to 2010, all national oral health surveys of the AI/AN population sampled I/T/U dental clinic patients. In 2010, IHS began using community-based samples as the standard for monitoring the oral health of AI/AN children. To determine if a dental clinic-based sample is representative of the community, and to establish the relationship between the two different sampling methodologies (school-based vs. clinic-based), two different population groups were screened during 2016-2017; I/T/U dental clinic patients aged 6-9 years and elementary school children in kindergarten, first, second, and third grade. When the 6-9 year old dental clinic patients are compared to similarly aged elementary school children, there is no significant difference in the prevalence of dental caries experience in all teeth (primary and/or permanent). Dental clinic patients, however, have a significantly higher prevalence of untreated dental caries and dental sealants. If only the permanent teeth are considered, dental clinic patients have a significantly higher prevalence of dental caries experience, untreated dental caries and dental sealants.

Figure 4: Prevalence of dental caries experience, untreated dental caries and dental sealants among 6-9 year old children; AI/AN dental clinic patients compared to AI/AN school children



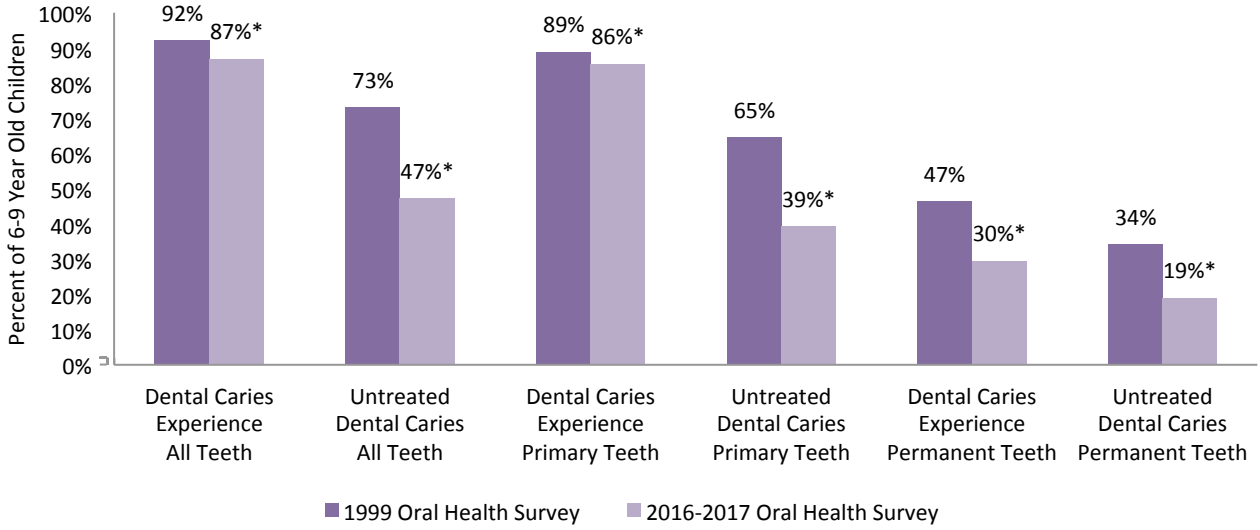
Data Source: 2016-2017 IHS oral health survey of AI/AN children aged 6-9 years
**Significantly different than dental clinic patients, p<0.05*

In the future, oral health surveillance of this age group may be conducted using a sample of dental clinic patients. This year's survey helps establish the relationship between the two sampling methodologies and provides valuable information on the differences in the oral health status of AI/AN elementary school children compared to those AI/AN children who seek dental care at I/T/U dental clinics.

Key Finding #4: Since 1999, there have been significant improvements in the oral health of American Indian and Alaska Native dental clinic patients aged 6-9 years.

The previous oral health survey of AI/AN dental clinic patients aged 6-9 years was conducted in 1999.[6] Since 1999, the percent of dental clinic patients with untreated dental caries in a primary or permanent tooth has decreased by 36%; dropping from 73% in 1999 to 47% in 2016-2017. The percent with untreated dental caries in a permanent tooth has decreased by 44%; dropping from 34% in 1999 to 19% in 2016-2017. The decrease in untreated dental caries suggests that access to and/or use of the dental care delivery system has improved. In addition, the percent of children with dental caries experience in a permanent tooth has decreased from 47% in 1999 to 30% in 2016-2017, a 36% reduction. Although there have been large decreases in untreated decay and dental caries experience in the permanent teeth, the reduction in dental caries experience in the primary dentition was only 3%; dropping from 89% in 1999 to 86% in 2016-2017.

Figure 5: Percent of AI/AN dental clinic patients aged 6-9 years with dental caries experience and untreated dental caries, 1999 vs. 2016-2017



Data Sources: 1999 (secondary analysis) and 2016-2017 IHS oral health surveys of AI/AN dental clinic patients
**Significantly different than 1999, p<0.05*

Key Finding #5: IHS, Tribal and Urban programs have surpassed the Healthy People 2020 objective for dental sealants but have not met the objectives for dental caries.

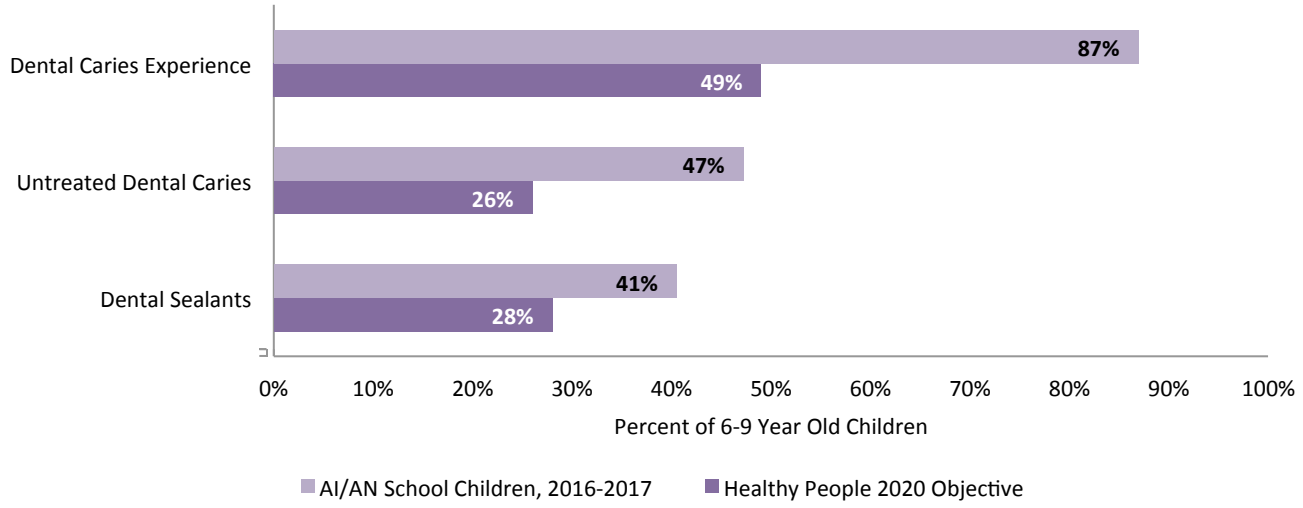
Healthy People 2020 (HP2020) is the federal government's prevention agenda for building a healthier nation. It is a statement of national health objectives designed to identify the most significant preventable threats to health and to establish national goals to reduce these threats. HP2020 includes three oral health objectives (OH 1.2, OH 2.2 and OH 12.2) for children aged 6-9 years:[7]

- Reduce the proportion of children aged 6 to 9 years with dental caries experience in their primary or permanent teeth to 49%.

- Reduce the proportion of children aged 6 to 9 years with untreated dental decay in their primary or permanent teeth to 26%.
- Increase the proportion of children aged 6 to 9 years who have received dental sealants on one or more of their permanent first molar teeth to 28%.

In relation to these three objectives I/T/U dental programs have not, and likely will not, meet the HP2020 objectives for dental caries experience and untreated dental caries. However, in relation to the proportion of children aged 6 to 9 years with dental sealants in permanent first molars, AI/AN children have already surpassed the HP2020 objective (Figure 6).

Figure 6: Percent of AI/AN elementary school children aged 6-9 years with dental caries experience, untreated dental caries and dental sealants compared to HP2020 objectives



Data Source: 2016-2017 IHS oral health survey of AI/AN elementary school children

Recommendation: To improve the oral health of American Indian and Alaska Native school-age children, we recommend that programs prioritize access to preventive and restorative dental care.

To reduce dental caries prevalence, I/T/U programs should focus on the primary prevention of tooth decay. Evidence-based prevention strategies include community water fluoridation, brushing twice daily with toothpaste containing fluoride, professionally applied topical fluorides, dental sealants, and good eating habits. Although the prevalence of permanent tooth caries experience has decreased since 1999, there has been little change in primary tooth caries experience. This suggests that current prevention strategies may be effective with school-age children but I/T/U dental programs should continue to prioritize primary prevention of dental caries in younger children. Because AI/AN children develop caries at such a young age, primary prevention must begin with oral health education of pregnant and breastfeeding mothers and include early access to preventive dental care for infants and toddlers before the age of 2 years.

To reduce the prevalence of untreated dental caries, I/T/U programs should strive to improve access to dental services and increase use of the dental care delivery system for school-age children. In some communities this may require an increase in the number of dental professionals or increased outreach efforts of the local dental program to conduct screenings, timely referrals, and case management for this age group. Other secondary prevention strategies include basic restorations, interim therapeutic restorations, and the use of silver ion antimicrobials.

Data source and methods.

This data brief is based on data from the 2016-2017 IHS oral health survey of AI/AN children. The survey sampled two different population groups – (1) elementary school students in kindergarten, first, second, and third grade and (2) patients aged 6-9 years seeking care at I/T/U dental clinics. Data from the National Center for Education Statistics' Elementary/Secondary Information System (https://nces.ed.gov/ccd/elsi/) were used to develop the sampling frame for the school portion of the survey. All schools overseen by the Bureau of Indian Education (BIE) plus public and private schools where at least 50% of the enrolled children were AI/AN (≥40% for schools in California and Oklahoma) were included in the sampling frame. The sampling frame represents approximately 35% of all AI/AN children in BIE, public and private schools. The sampling frame was ordered by school type (BIE, public, private) and state. A systematic probability proportional to size sampling scheme was used to select a national level sample – 76 schools in 20 states representing 69 sampling intervals. Several clinics opted to screen additional schools and some clinics were unable to screen their assigned school(s). This brief includes data from 83 schools in 16 states representing 57 of the 69 sampling intervals (83% response rate).

For the dental clinic portion of the survey, the 2014 IHS user population was used to select a national level sample of service units. A service unit is how the IHS divides its services and can consist of more than one dental clinic. In 2014, there were 167 service units with a user population of 10 or more AI/AN children aged 5-9 years of age. The sampling frame was ordered by IHS Area and service unit number. A systematic probability proportional to size sampling scheme was used to select 43 service units. For a variety of reasons, not all of the selected service units were able to participate. Data is available for 32 of the 43 service units (74% response rate). Four additional service units volunteered to participate resulting in 36 service units. For the 36 participating service units, data was obtained at 46 different I/T/U dental clinics.

The following information was collected for each child: age, sex, tooth specific caries and sealant status plus treatment urgency. We used the *Basic Screening Survey* clinical indicator definitions and data collection protocols.[8] Race was recorded as AI/AN or other. Only children classified as AI/AN were included in the analyses. Examiners included dentists, dental hygienists and dental therapists employed by I/T/U programs. Examiners were required to view an examiner training webinar; no formal calibration was undertaken and examiner reliability was not assessed. Screenings were

completed using dental mirrors and an external light source. Examiners collected data using paper forms which were mailed to a central location. All statistical analyses were performed with SAS software (Version 9.3; SAS Institute Inc., Cary, NC). Sample weights were used to produce population estimates based on selection probabilities. It should be noted that the sampling strategy for the school portion of the survey was based on grade rather than age; therefore, children between 6-9 years of age in the participating schools were not screened if they were in grades other than K-3rd. Because 9 year olds may be in fourth grade, the school survey underrepresented 9 year old children. The 2016-2017 survey was designed to obtain national, rather than IHS Area estimates; therefore, IHS Area specific data is not presented.

Definitions.

Dental caries experience: Refers to having untreated decay or a dental filling, crown, or other type of restorative treatment such as silver ion antimicrobial. Also includes teeth that were extracted because of tooth decay.

Untreated dental caries: Describes dental cavities or tooth decay that have not received appropriate treatment.

Dental sealants: Describes plastic-like coatings applied to the chewing surfaces of back teeth. The applied sealant resin bonds into the grooves of teeth to form a protective physical barrier.

About the authors.

Kathy R. Phipps is an oral health surveillance consultant. Timothy L. Ricks is the Deputy Director of the IHS Division of Oral Health.

References.

1. Jackson SL, Vann WF Jr, Kotch JB, Pahel BT, Lee JY. Impact of poor oral health on children's school attendance and performance. Am J Public Health 2011;101:1900-6.
2. Phipps KR and Ricks TL. The oral health of American Indian and Alaska Native children aged 1-5 years: results of the 2014 IHS oral health survey. Indian Health Service data brief. Rockville, MD: Indian Health Service. 2015.
3. Phipps KR, Ricks TL, Blahut P. The oral health of 6-9 year old American Indian and Alaska Native children compared to the general U.S. population and Healthy People 2020 targets. Indian Health Service data brief. Rockville, MD: Indian Health Service. 2014.
4. Dye BA, Thornton-Evans G, Li X, Iafolla TJ. Dental caries and sealant prevalence in children and adolescents in the United States, 2011–2012. NCHS data brief, no 191. Hyattsville, MD: National Center for Health Statistics. 2015.
5. Dye BA, Li X, Thornton-Evans G. Oral health disparities as determined by selected Healthy People 2020 oral health objectives for the United States, 2009–2010. NCHS data brief, no 104. Hyattsville, MD: National Center for Health Statistics. 2012.

6. Indian Health Service. The 1999 Oral Health Survey of American Indian and Alaska Native Dental Patients: Findings, Regional Differences and National Comparisons. Rockville, MD: Indian Health Service.
7. Healthy People 2020 Oral Health Objectives. www.healthypeople.gov/2020/topics-objectives/topic/oral-health/objectives. Accessed March 20, 2017.
8. Association of State and Territorial Dental Directors. Basic screening surveys: an approach to monitoring community oral health. Available at: www.astdd.org/basic-screening-survey-tool/.

Data tables.

Table 1. Number of AI/AN ***elementary school children*** screened by grade and age, 2016-2017

	Number	Weighted Percent
Grade		
Kindergarten	1,206	22.8
First	1,538	25.6
Second	1,481	25.6
Third	1,522	26.1
Age		
5 years	881	14.9
6 years	1,403	25.2
7 years	1,410	24.8
8 years	1,468	24.2
9 years	552	10.3
10-11 years	33	0.6

Table 2. Prevalence of decay experience, untreated tooth decay and dental sealants in the primary and permanent teeth among AI/AN ***elementary school children*** aged 6-8 or 6-9 years, 2016-2017

Variable	6 8 Year Olds			6 9 Year Olds		
	Percent	Lower 95% CL	Upper 95% CL	Percent	Lower 95% CL	Upper 95% CL
Primary teeth						
Decay experience	86.1	83.3	89.0	85.5	82.8	88.2
Untreated decay	40.0	35.6	44.4	39.3	34.8	43.7
Dental sealants	16.2	11.2	21.2	15.4	10.6	20.2
Permanent teeth*						
Decay experience	27.3	23.3	31.3	29.5	25.5	33.5
Untreated decay	17.9	14.0	21.7	19.0	15.1	22.8
Dental sealants	40.2	34.4	46.0	40.5	34.8	46.2
Primary and/or permanent teeth						
Decay experience	87.0	84.3	89.7	86.9	84.3	89.4
Untreated decay	47.3	42.3	52.4	47.2	42.1	52.3
Dental sealants	44.1	38.0	50.3	44.1	38.0	50.1

*Limited to those children with at least one permanent tooth

Table 3. Mean number of teeth decayed, missing due to caries, filled or with arrested decay among AI/AN ***elementary school children*** aged 6-8 or 6-9 years, 2016-2017

Variable	6 8 Year Olds		6 9 Year Olds	
	Mean	Standard Error	Mean	Standard Error
Primary teeth				
Decayed (d)	1.4	0.1	1.4	0.1
Missing (m)	0.7	0.1	0.7	0.1
Filled (f)	3.7	0.2	3.5	0.2
Arrested (a)	0.0	0.0	0.0	0.0
dmf(a)t	5.9	0.2	5.6	0.2
Permanent teeth*				
Decayed (D)	0.3	0.0	0.3	0.0
Missing (M)	0.0	0.0	0.0	0.0
Filled (F)	0.2	0.0	0.2	0.0
Arrested (A)	0.0	0.0	0.0	0.0
DMFT	0.5	0.0	0.6	0.1

*Limited to those children with at least one permanent tooth

Table 4. Number of AI/AN ***dental clinic patients*** screened by age, 2016-2017

	Number	Weighted Percent
6 years	462	25.0
7 years	449	25.0
8 years	409	25.0
9 years	417	25.0

Table 5. Prevalence of decay experience, untreated tooth decay and dental sealants in the primary and permanent teeth among AI/AN ***dental clinic patients*** aged 6-8 or 6-9 years, 2016-2017

Variable	6 8 Year Olds			6 9 Year Olds		
	Percent	Lower 95% CL	Upper 95% CL	Percent	Lower 95% CL	Upper 95% CL
Primary teeth						
Decay experience	85.3	82.3	88.4	84.6	81.5	87.8
Untreated decay	46.3	42.0	50.5	43.4	39.5	47.3
Dental sealants	17.9	14.7	21.1	18.0	14.4	21.6
Permanent teeth*						
Decay experience	27.9	25.3	30.5	34.4	31.7	37.2
Untreated decay	20.2	17.9	22.4	23.8	21.4	26.2
Dental sealants	44.7	40.4	49.0	50.5	46.2	54.7
Primary and/or permanent teeth						
Decay experience	86.9	84.1	89.8	87.9	85.2	90.7
Untreated decay	52.4	47.4	57.3	52.4	47.9	56.9
Dental sealants	52.0	47.2	56.8	56.4	52.1	60.7

*Limited to those children with at least one permanent tooth

Table 6. Mean number of teeth decayed, missing due to caries, filled or with arrested decay among AI/AN ***dental clinic patients*** aged 6-8 or 6-9 years, 2016-2017

Variable	6 8 Year Olds		6 9 Year Olds	
	Mean	Standard Error	Mean	Standard Error
Primary teeth				
Decayed (d)	1.6	0.1	1.4	0.1
Missing (m)	0.5	0.0	0.5	0.0
Filled (f)	3.6	0.2	3.3	0.1
Arrested (a)	0.0	0.0	0.0	0.0
dmf(a)t	5.7	0.2	5.2	0.2
Permanent teeth*				
Decayed (D)	0.4	0.0	0.5	0.0
Missing (M)	0.0	0.0	0.0	0.0
Filled (F)	0.2	0.0	0.3	0.0
Arrested (A)	0.0	0.0	0.0	0.0
DMFT	0.6	0.0	0.8	0.1

*Limited to those children with at least one permanent tooth

Suggested citation.

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